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UNCLASSIFIED- INFORMATION ON SOVIET BLOC INTERNATIONAL GEOPHYSICAL COOPERATION -1960

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INFORMATION ON INTERNATIONAL GEOPHYSICAL COOPERATION -- SOVIET-BLOC ACTIVITIES

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I. GENERAL

Czechs Produce a Portable Quartz Semiconductor Clock

A portable quartz semiconductor clock has been designed by workers of the Institute of Radio Technology of the Czechoslovak Academy of Sciences under the direction of Engineer Tol'man. It will not only operate from a power-supply network, but also on a battery housed in the body of the instrument with the clock mechanism. This design makes it possible to use the instrument either inside or under field conditions. The clock weighs 17.9 kg, including the weight of the battery. The current consumption is 4 kwh. Despite its small weight and size the clock provides maximum accuracy in time measurement: the maximum possible deviation in one year is 1 second.

The quartz clock is used primarily in astronomy and geodesy and also in laboratories where great accuracy in time measurement is essential. (Taken from "Czechoslovakia 1960," Information Bulletin of the Czechoslovakian Exhibition in Moscow.) ("Quartz Semiconductor Clock," Priroda, No. 7, 1960, p. 117)

New Soviet Periodical "Geology and Geophysics"

The first number of the new journal "Geology and Geophysics" has now been issued. This monthly publication of the Siberian Division of the Academy of Sciences of the USSR is edited by Academician A. A. Trofimuk. The subject matter will be confined largely to geological and geophysical papers relating to Siberia.

The announcement of this new publication is accompanied by a table of contents for the first number. ("On the Journal 'Geology and Geophysics,' No. 1, 1960," Izvestiya Akademii Nauk SSSR, Seriya Geologicheskaya, No. 8, 1960, p. 101)

II. ROCKETS AND ARTIFICIAL EARTH SATELLITES

Conclusions Drawn from Czech Study of Meteorite Shower

"In the spring of 1959 a shower of meteorites occurred near Brzhlbram (Czechoslovakia); this phenomenon is helping to provide certain data which are important for the solution of the problem of return of space vehicles to Earth. This was the first case when observations of a shower of meteorites was made from two points by the use of a camera with rotary shutters.

"On the basis of such data as the total mass of the meteorites falling to Earth, their specific gravity, the velocity of meteoric flight through the atmosphere, braking, change in path, and several other criteria, important information was derived relative to the aerodynamic heating of these bodies at a velocity of 21 km/sec. Computations have shown that of the initial meteorite mass of 6.6 tons only 0.1% remained after passage through the atmosphere.

"If we take this result as a basis for other considerations, then with the penetration of a cosmic rocket into the Earth's atmosphere in a vertical direction, but at a lesser flight velocity (11.2 km/sec), we may conclude that a rocket of a material similar to that in the meteorites would be 75% burned up enroute and only one-quarter of its mass would reach the Earth." ("Meteorites Help Astronautics," Priroda, No. 7, 1960, p. 116)

The Physical and Mental Demands Facing Cosmonauts

A recent article appearing in Smena is a rather superficial commentary on the physical and mental demands facing the first space travellers. An effort is made to indicate that Russians are better prepared physically to subject themselves to these demands than are others. A potential candidate for space travel must be in superb physical condition, he must have the training of an athlete, and he must have all the assistance offered by cosmic psychology. ("What Should a Cosmonaut Be Like?" by R. Podol'nyy and V. Sazhin, Smena, No. 17, September 1960, pp. 2-3)

Science and Propaganda

There are two types of articles on space technology to be found in the Soviet press -- feature articles of a high scientific order and those interlarded with unfavorable commentary directed against the capitalist world. The titles of these articles are often no clue to their actual contents or scientific value.

Thus, Professor G. Pokrovskiy, writing at some length in a recent issue of Ekonomicheskaya Gazeta, ostensibly in a review of Soviet space achievements during the last three years, expends a great amount

of verbiage in defaming the United States and other capitalist countries. Example: "The American government is not so much striving for scientific results as for the ability to use space for military purposes, in particular for espionage against the Soviet Union and other socialistic countries. The rapid development of space technology in the United States is closely related to the desire of the monopolies for unprecedented super-profits...the United States not only did not suffer during the Second World War, but grew rich on military orders."

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Such articles may contain information of scientific value, but the present article, other than reviewing Soviet achievements during the last three years, does not. ("Man, Technology and Space," by Professor G. Pokrovskiy, Ekonomicheskaya Gazeta, 27 September 1960, pp. 3-4)

III. UPPER ATMOSPHERE

Feature Article on Work at the Shternberg Observatory

A recent article in the Ekonomicheskaya Gazeta describes the work of astronomers at the P. K. Shternberg Observatory. It includes an interview with astronomer Tamara Petrovna as she uses an astrometric astrograph to photograph nebulae. Her work at the moment was observation and photographing of nebula "128" with an "AFR-1" astrograph. (This instrument is presumably that shown in the large photograph accompanying the article.) The astronomical telescope is moved automatically with a clock mechanism but the observer must remain glued to the eyepiece and hold the image in the cross-hairs. The nebula "128" is being photographed for inclusion in a catalogue of faint stars.

In another pavilion a zenith-telescope was being used for observations of change in latitude.

The article describes the types of work done at the observatory, its publications, facilities and equipment; a number of personalities are mentioned. ("Night with the Stars," by A. Presnyakov, Ekonomicheskaya Gazeta, 14 September 1960, p. 4)

Pulkovo Astronomer Discusses the Nucleus of Our Galaxy

Yu. N. Pariyskiy of the Main Astronomical Observatory at Pulkovo is the author of a recent article in Priroda. We quote: "As a result of the processing of data provided by the Pulkovo radiotelescope, we have found that the most intense radiation comes from a very small and unusually dense cloud of ionized gas precisely in the center of the Galaxy and constituting the real nucleus of the Galaxy. Its diameter is about 20 light years, that is, 35,000 times less than the diameter of the Galaxy." This is the theme of his article, but he does not expand on it to any great extent. ("New Information on the Nucleus of Our Galaxy," by Yu. N. Pariyskiy, Priroda, No. 7, 1960, pp. 51-52)

Another Pulkovo Astronomer Comments on Radioastronomy

A brief article in Izvestiya carries an interview with Professor S. G. Khaykin, Doctor of Physical-Mathematical Sciences, a famed Russian radiophysicist. Little of substance is contained in his remarks: a few facts about the development of radioastronomy as a science, mention of the discovery of the radioradiation of interstellar hydrogen, and radioradiation of waste material from supernovae. This science, he concludes, has a far greater "reach" into the universe than does optical astronomy. (The photograph shows a radioastronomical unit at Pulkovo.) ("Astronomy Plus Radiophysics," Izvestiya, 21 September 1960, p. 3)

Report on Estonian Meteorite Craters on Saaremaa Island

A six-page article in a recent issue of Priroda provides what may be the best overall discussion of the meteorite craters found on Saaremaa Island off the Estonian coast. They are said to be the only such phenomena in Europe in such an excellent state of preservation.

The Kaaliyarv group consists of seven craters in an area of about 0.75 km^2. (Figure 1 is an orientation map, Figure 2 shows the arrangement of the craters at the site, Figure 3 is a sketch of the largest crater.) The largest crater is completely round, with a diameter of 110 m; the wall of earth thrown up around the crater rises 6 to 7 meters above the level of the surrounding area.

This article discusses the craters in detail, describes the excavations that have been made, and gives the conclusions arrived at by researchers. There is evidence that the meteorite fell approximately 4,000 to 5,000 years ago. ("The Kaaliyarv Craters," by Ye. L. Krinov, Priroda, No. 7, 1960, pp. 55-60)

Discussion of the Earth's Outer Radiation Belt

S. A. Slavatinskiy of the Physical Institute im. P. N. Lebedev has written a four-page discussion of the Earth's radiation belt for the readers of the Soviet popular science journal Priroda. Intended for popular consumption, the article is an excellent summarization of the most important facts now known about this phenomenon, but apparently conveys no new factual material. ("The Outer Radiation Belt," by S. A. Slavatinskiy, Priroda, No. 7, July 1960, pp. 3-6)

On the Problem of Communication with Intelligent Beings on Other Planets

The Soviets are keenly interested in the problem of possible communication with intelligent beings on other planets. This is clearly indicated in a well-written and informative 10-page article recently appearing in Priroda. The various topics discussed are: "Do Other Planetary Systems Exist?"; "The Jeans Hypothesis"; "What Can be Learned from Stellar Rotation"; "The Plurality of Planetary Systems"; "Where Can Life Arise?"; "How Many Planets Can be the Cradle of Intelligent Beings?"; "Interstellar Communication"; "What is the Nature of This Communication Channel?"; "How Far Will the Signal Reach?"; "How to Overcome Interference"; "In What Direction to Make the Search." ("Is Communication Possible with Intelligent Beings on Other Planets?" by Professor I. S. Shklovskiy, Priroda, No. 7, July 1960, pp. 21-30)

IV. METEOROLOGY

Measurement of the Length of Lightning

The following is a full translation of a Priroda article by I. M. Imyanitov, Candidate in Physical-Mathematical Sciences, of the Main Geophysical Observatory in Leningrad:

How long is lightning? The length of the bolts which strike the Earth does not exceed several kilometers. Lightning passing through the clouds can be considerably longer.

During a flight near thunderheads in the vicinity of Sverdlovsk on a TU-104, equipped for meteorological research, observations were made of several very long lightning flashes. These flashes emerged from the upper part of the cloud, passed over it and finally disappeared again into the cloud.

Since the course of the aircraft was parallel to the path of one of the bolts, and the points at which it entered and left the cloud were observed, it was possible to determine the length of the path followed by the lightning. The length of the bolt was 50-60 km, in any case, greater than 50 km. The lightning path observed can be explained only by the fact that there are charges of different signs within the cloud. It was later possible to confirm this explanation by direct investigations of the distribution of charges in thunder and shower clouds.

It should be mentioned that the mentioned length of lightning is not the greatest ever observed. For example, in the United States lightning flashes have been observed by radar whose length has exceeded 150 km. (See M. Ligda, J. Atmosph. and Terr. Phys., v. 9, 1956, p. 329.)

("On the Length of Lightning," by I. M. Imyanitov, Priroda, No. 7, 1960, p. 110)

A New Acoustic Instrument for Warning of Impending Storms at Sea

G. D. Novinskiy, a Russian physician, has devised a new instrument for use on ships to warn of impending storms. He had observed that various forms of animals are seemingly aware of approaching storms -- sea gulls, jellyfish, whales, and even water fleas react in one way or another. He found that it was the structure of their ears which enabled them to hear "the voice of the sea." He therefore developed an electronic acoustic device capable of "hearing" a storm as much as fifteen hours in advance. The instrument when on shipboard turns slowly, like a radar unit. These results have been confirmed by laboratory tests at the Oceanographic Institute of the Academy of Sciences of the USSR. ("Herald of Storms," by V. Orlov, Nedelya (Izvestiya Sunday Supplement), No. 30, 18-24 September 1960, p. 5)

Bibliographical References on Weather Modification

The following is the full translation of two bibliographical references on weather modification appearing in the Referativnyy Zhurnal -- Geofizika; 9585. The Dissipation of Supercooled Fogs from the Ground by a Silver Iodide Aerosol, by Seregin, Yu. A., Works of the Central Aerological Observatory, 1958, Issue 19, 68-80.

This article gives the results of experiments of the influence of a silver iodide aerosol on supercooled fogs from the ground. The experiments were made by the Active Reaction Laboratory of the Central Aerological Observatory in 1956-1957 at Alma-Ata for the purpose of collecting suitable experimental data and the clarification of problems of a methodical character for drawing up instructions for the clearing of airfields of supercooled fogs from the ground. The silver iodide aerosol generator resembles a gas burner operating on hydrogen; a solution of silver iodide is fed into the flame. The silver iodide solution is prepared in the following manner: ammonium iodide is dissolved in water, silver iodide is added to this solution, and it is thereafter diluted with acetone to the necessary concentration. The solution used in the experiments consisted of 850 cm^3 of acetone, 150 cm^3 of water, 200 g of ammonium iodide and 200 g of silver iodide. This particular concentration provided a supply of silver iodide to the generators of up to 8 g/min. The selected length of operation of the generator was 15-20 minutes for the first cycle and 5-10 minutes for the next. During the experiments a wide range of meteorological observations was made in the immediate vicinity of the generator to determine the effects; these were supplemented by observations made at the Air Weather Station of the Civil Air Fleet. At the observation point temperatures were measured at a height of 2 m by a ventilated thermometer; wind direction was recorded by an anemometer. Values for wind velocity and direction at a height of 15 m were taken from observational data provided by the Air Weather Station of the Civil Air Fleet. The water content of the fog was determined by a Zaytsev instrument. Observations were also made of the microstructure of the fog before and after the artificial reaction; in some experiments impressions were made of crystals which fell on strips of methylmethacrylate. The experiments were made at night; the moment of appearance of crystals was determined by their twinkling in the beam of a searchlight. The experiments were made at the Alma-Ata airport during fogs at various temperatures, of different water content and vertical development, and under other variable meteorological conditions. The crystallizing zone of the fog spreads out from the generator in horizontal and vertical directions. The boundaries of the cleared zone were recorded for various moments of time and are given in this book for a number of the most characteristic cases. These experiments demonstrated that the action of a silver iodide aerosol on a supercooled fog from the ground is an extremely effective means for clearing limited areas from fog. In 12 experiments the reaction caused by one

generator was accompanied by the clearing of fog over an area of 2.5 to 5 km^2; the landing strip was completely cleared and aircraft made landings and takeoffs. It was established that an extremely important role is played by the feeding of the reagent. The amount fed must be determined by taking into account the characteristics of the fog and the meteorological conditions. When taking samples of crystals at the end of the reaction a certain quantity of crystals was noted measuring up to 15μ. This is evidence that the particles of silver iodide gradually acquire their ice-forming properties and do not all simultaneously do so on introduction into the supercooled fog. (Reviewer: V. I. Belyayev)

9686. Investigation of the Influence of Magnesium Antimonide on the Formation of Ice Particles in a Supercooled Water Fog, by N. F. Gol'tyakov and P. N. Krasikov, Works of the Main Geophysical Observatory, 1958, Issue 82, pp. 36-40.

The parameters of a lattice of magnesium antimonide (Mg_3Sb_2) are close to the parameters of an ice lattice. It is known that this reagent causes the formation of ice crystals in a supercooled fog at a temperature between -2.5° to 4° C. The authors briefly describe the procedure for producing Mg_3Sb_2 and discuss the difficulties of producing this reagent. A series of laboratory reactions showed that on sublimation of Mg_3Sb_2 in a supercooled fog the upper boundary of manifestation of the ice phase is about -10°, -11° C. On spraying a water suspension of Mg_3Sb_2 into a fog the temperature boundary rose to -8°, -9° C. The practical use of the Mg_3Sb_2 reagent is associated with great difficulties caused by its complexity of production and dispersion, instability, etc. (Reviewer: I. P. Mazin)

(Bibliographical References 9685 and 9686 from "Referativnyy Zhurnal -- Geofizika," No. 9, 1959)

New Estonian Scientific Publication

The Institute of Physics and Astronomy of the Academy of Sciences of the Estonian SSR in 1959 began the publication of a series called Issledovaniya po fizike atmosfery (Research in Atmospheric Physics). The new series will contain papers written in the Department of Atmospheric Physics of the Institute as well as papers on related subjects by other authors and institutions. The publication will appear irregularly. It is planned to publish an issue every one or two years. Articles will be in the Russian language with English summaries. ("Issledovaniya po fizike atmosfery," No. 1, 1959; Tartu, Estonian SSR)

Conference on Meteorological Research During the IGY

A scientific conference on the results of research in the field of meteorology during the International Geophysical Year, called at the request of the Main Administration of the Hydrometeorological Service

(GUGMS), was held at the Main Geophysical Observatory imeni A. I. Voyeykov from 29 February to 4 March 1960. Representatives from GUGMS, scientific research institutes and local administrations of the Hydrometeorological Service, institutes and laboratories of the Academy of Sciences USSR, the Arctic and Antarctic Scientific Research Institute, Moscow and Leningrad state universities, Leningrad and Odessa hydrometeorological institutes, the Air Force Engineering Academy imeni A. F. Mozhayskiy, and other scientific institutions and planning organizations, totaling more than 400 persons, took part in the Conference. A total of 42 reports on problems of general atmospheric circulation, radiation and heat balance, atmospheric ozone, chemistry of precipitations, condensation nuclei and atmospheric electricity were delivered. ("Scientific Conference on the Results of Investigations in the Field of Meteorology During the International Geophysical Year," by G. P. Pisareva; Moscow, Meteorologiya i gidrologiya, No. 8, 1960, pp. 60-62)

V. OCEANOGRAPHY

Oceanographic Research in the Black Sea and Mediterranean

The following is the full text of an article recently appearing in Izvestiya:

Sevastopol'. 22 September (by telephone from our correspondent). The staff of the Sevastopol' Biological Station of the Academy of Sciences of the USSR is conducting extensive work in studying life in the seas of the southern part of our country. Especially valuable hydrobiological research has been accomplished in the Black Sea. Scientific workers of the Sevastopol' station have made an expedition into the Mediterranean Sea aboard the station's ship "Academician A. Kovalevskiy." They have collected valuable data for comparison of the processes of biological productivity of the Black Sea and Mediterranean. They have proposed new topics for study of the life of the Mediterranean basin and have established contacts with many researchers in Rumania, Bulgaria, Turkey, the United Arab Republic, Albania, Yugoslavia, Italy and Greece.

The expeditionary vessel "Academician A. Kovalevskiy" has now departed on its next three-week scientific research cruise. Scientists aboard are conducting a series of continual observations of the course of physical, chemical and biological processes in the Black Sea.

The Soviet specialists are accompanied in this research effort by a group of scientists of the Belgrade Academy of Sciences.

("Secrets of the Southern Seas," Izvestiya, 23 September 1960, p. 5)

VI. ARCTIC AND ANTARCTIC

Radio Reports from Antarctica -- November and December 1959

The following is the full translation of reports on Antarctica for January 1960 sent by A. G. Dralkin, Chief of the Fourth Continental Expedition.

Mirnyy Observatory

Aerometeorological research. In November the mean values at the Earth's surface were: atmospheric pressure -- 973.9 mb; air temperature -- -9.1°; wind velocity -- 9.8 m/sec; relative humidity -- 70%. Overall cloud cover was 5. The mean height reached by radiosondes was 23,805 m. The air temperature during the month varied from -20° to 0°. The number of days with snowstorms was 16; total precipitation amounted to 31.7 mm. During the month 241,517 kg of snow were blown across 1 meter of coast line.

During November the observatory furnished forecasting service for the aircraft of the whaling flotillas "Sovetskaya Ukraina" and "Slava," and also for the diesel-propelled vessel "Kooperatsiya."

In December the mean values at the Earth's surface were: atmospheric pressure -- 988.9 mb; air temperature -- -1.9°; wind velocity -- 7.8 m/sec; relative humidity -- 70%. Overall cloud cover was 6.8. The height reached by radiosondes was 23,617 m. Air temperature during the month varied from -4.7° to 10.9°. Total precipitation was 19.3 mm. There were 11 days with snowstorms; 15,329 kg of snow were blown across 1 m of shore line.

Geophysical research. A considerable disturbance of the magnetic field was observed in November. The most intense disturbances were noted on 1-4, 14, 28 and 30 November.

The general state of the ionosphere was calm, but cases of complete absorption were observed at the end of the month. The mean critical frequency of the F2 layer dropped. The F1 layer existed regularly in the first half of the Greenwich day in a range of 3 to 5 mc. The frequency of the E-layer increased to 3.8 mc. By the end of the month this layer was observed throughout the day. Minimum frequencies had a normal daily variation not exceeding 2 mc. The sporadic layer appeared in the second half of the Greenwich day with screening of the layers farther aloft. Sixty-five earthquakes were recorded.

In December the maximum disturbances of the magnetic field were observed on 1-6, 14-15, and 23-31 December. The stormiest days were 1, 2, 3, 27 and 28 December. A moderate storm began on 5 December.

The ionosphere was disturbed during the month, but complete absorption was rarely observed and did not exceed one hour. The maximum critical frequencies of the F2 layer dropped to 7 mc. The E-layer existed during the entire day with a maximum critical frequency of 4 mc, and a minimum of 1.8-1.6 mc. The sporadic layer rarely appears.

Hydrological research. In November and December observations were made from the pack ice along a meridional profile. Measurements were made of the temperature of the water at various horizons, ice measurement surveys were made in the coastal sector of the pack ice and an aerial ice reconnaissance of the Davis Sea was executed.

Vostok Station

In November the mean values at the Earth's surface were: atmospheric pressure -- 621.0 mb; air temperature -- -44.9°; wind velocity -- 6.3 m/sec; relative humidity -- 78%; temperature of the snow surface -- -42.7°. Overall cloud cover was 4.5. Air temperature during the month varied from -59.0° to -33.5°. A south-southwesterly wind predominated. The mean height reached by radiosondes was 20,200 m; the mean height reached by pilot balloons was 18,731 m.

A near-surface inversion was observed regularly during the month, although its thickness became considerably less. The tropopause was characterized by a retarded gradient, and by the end of November -- by inversion. The mean height of the tropopause proved to be equal to 9,827 m with a mean temperature of -67.5°.

In December the mean values at the Earth's surface were: atmospheric pressure -- 632.9 mb; air temperature -- -31.1°; wind velocity -- 5.0 m/sec; relative humidity -- 78%; temperature of the snow surface -- -30.4°. Overall cloudiness was 3.0. Air temperature during the month varied from -45.5° to -21.0°. A west-southwesterly wind predominated. The mean height reached by radiosondes was 21,900 m; the mean height reached by pilot balloons was 19,642 m.

An increase of temperature to -30°, -35° made it possible to determine air humidity by height and follow its gradual fall. No cases of increase in humidity with height were observed even in the clouds which near Vostok station were poorly developed vertically and of a low density.

The inversion, which continued the greater part of the month, disappeared completely on those days when the wind intensified. During December there was a considerable rise in the mean temperatures in the troposphere and stratosphere. The height of the tropopause was 9,056 m and the tropopause had a mean temperature of -58.3°.

In November the state of the ionosphere was characterized by a decrease in critical frequencies of the F2 layer. Cases were observed of a simultaneous decrease in the critical frequencies of the F1 and F2 layers to values less than the critical frequency of the E-layer.

The sporadic layer was often observed during the daytime, merging with height with the E-layer. There was a considerable increase in the activity of the magnetic field. The mean daily K-index during the month increased to 26.6. There were 2 calm days, 12 moderately disturbed days, and 16 highly disturbed.

The state of the ionosphere in December was characterized by low critical frequencies of the F2 layer with considerable diffuseness. The values of the minimum frequencies of reflections were very low, often less than 0.5 mc. On 21 December there was an increase in absorption -- sometimes complete absorption -- for a period of several hours.

On 8 December regular radar observations of auroras were begun. By 31 December 2,150 frames had been exposed; there were reflections on 77. During the first ten days of the month two small storms were observed. The second 10-day period was characterized by a relatively calm field. Activity increased at the end of the month; during the period 23-30 December it was characterized by a moderate but continuous storm with amplitudes on the order of 500 γ.

Glaciological research was accomplished during the movement of trains into the interior of the continent and by observations in holes at the stations Vostok and Lazarev. Table 1 gives the mean density and temperature of the ice, based on observations at the station Vostok.

TABLE 1

Horizon (cm)	Mean Density	Temperature 10 Nov	20 Nov	30 Nov
Surface	0.32	-48.5	-36.0	-34.2
10	0.36	-54.2	-52.0	-48.8
50	0.34	-55.5	-53.8	-50.6
100	0.26	-57.9	-55.7	-53.0

Table 1 (continued)

Horizon (cm)	Mean Density	Temperature 10 Dec	21 Dec	31 Dec
Surface	0.33	-36.9	-25.2	-29.0
10	0.35	-	-30.8	-32.9
50	0.35	-47.2	-37.3	-39.0
100	0.35	-51.1	-41.1	-43.1

Komsomolskaya Station

In November the mean values at the Earth's surface were: atmospheric pressure -- 619.2 mb; air temperature -- -45.0°; relative humidity -- 72%. Brief falls of rime were observed during the entire month. The weather during November was essentially stable with a predominantly south-southeasterly wind with a mean velocity of 5.9 m/sec.

In December the mean values at the Earth's surface were: atmospheric pressure -- 633.1 mb; air temperature -- -29.2°; wind velocity -- 3.9 m/sec; relative humidity -- 72%. The deposition of crystalline rime was observed during the entire month.

Lazarev Station

In November the mean values at the Earth's surface were: atmospheric pressure -- 977.9 mb; air temperature -- -12°; relative humidity -- 83%; wind velocity -- 10.4 m/sec; temperature of the snow surface -- -11.8°. The mean height reached by radiosondes was 16,900 m. Air temperature varied from -27.5° to -1.0°. Winds were predominantly easterly. The total precipitation for the month was 118.7 mm.

Traverse by Sled-Tractor Trains

"Penguin" snowcats (two machines and two trailers) continued their traverse from a point with the coordinates 69°20' S., 95°00' E., and had moved 285 km in the direction of Komsomolskaya station by the end of November. During the traverse the slope of the ice sheet was leveled and gravimetric observations were made. Terrestrial refraction was determined during one full 24-hour layover for that purpose.

A second daylong stopover for the purpose of determining refraction was made in December. On 31 December the train arrived in Komsomolskaya where its work was completed. Seven men made the traverse, including four scientists.

During November the train of "Khar'kovchankas," made up of three snowcats and four trailers, equipped with a drilling rig, tools and instruments for doing glaciological research in accordance with an extensive program, and also for doing work in gravimetry, terrestrial magnetism and meteorology, travelled 480 km from Komsomolskaya to Vostok. The train left Vostok on 8 December and arrived at the South Geographic Pole on 26 December. On completion of work at the South Pole the train headed back to Vostok on 29 December. Sixteen men participated in the traverse, including eight scientists. ("By Radio from Antarctica," by A. G. Dralkin, Informatsionnyy Byulleten' Sovetskoy Antarkticheskoy Ekspeditsii, No. 17, 1960, pp. 34-37)

Radio Reports from Antarctica -- January 1960

The following is the full translation of reports on Antarctic activities for January 1960 sent by Ye. S. Korotkevich, Chief of the Fifth Continental Expedition.

Replacement of the Personnel of the Fourth Continental Expedition. On 12 November 1959 the diesel-electric vessel "Ob'" departed from Leningrad with the members of the Fifth Continental Expedition aboard. On 18 December 1959 the ship arrived at the pack ice off Queen Maud Land and began to break through a channel to Lazarev station. The vessel was unloaded during the period 20 through 27 December. During that period 843 tons of various kinds of freight were discharged.

During this same period scientific groups from the naval detachment and the Continental Expedition made a helicopter reconnaissance of the Lazarev shelf ice and hydrophysical observations on the pack ice.

Repeated measurements at the glaciological station showed that no visible changes had taken place on this part of the shelf ice since March 1959.

On 28 December the diesel-electric vessel "Ob'" set sail from Lazarev station and on 1 January 1960 approached the Japanese ice-cutter "Soyya" and led it to the pack ice. A helicopter was then used to unload fuel at the Japanese station Showa and the Australian station Mawson.

The "Ob'" arrived at the pack ice near Mirnyy on 14 January. After breaking through the heavy ice, on 25 January the "Ob'" escorted the diesel-propelled "Kooperatsiya" through the channel which had been forced through the ice. The "Kooperatsiya" had already arrived at the edge of the pack ice on 7 January. Forty-nine members of the expedition staff arrived on the "Kooperatsiya," including six foreign scientists: three German (German Democratic Republic), two Czechoslovakian, and one American.

On 9-10 January an IL-14 aircraft made a flight by the shortest route through the interior regions of the continent from Lazarev to Mirnyy. Aboard the plane were seven members of the air detachment and Ye. S. Korotkevich, Chief of the Fifth Continental Expedition.

The unloading which had begun on 26 January was completed on 31 January. A total of 1,800 tons was unloaded from the diesel-electric "Ob'" and 120 tons from the diesel-powered "Kooperatsiya." The transfer of the Mirnyy Observatory to the new staff was completed on 25 January. On 1 February the "Kooperatsiya" and "Ob'" set sail from the Mirnyy roadstead. The "Kooperatsiya" carried the workers of the Fourth Continental Expedition and the "Ob'" carried the members of the naval detachment.

Vostok Station

The new staff, ten members in all, headed by V. S. Sidorov, began their work on 10 January 1960. In January the mean values at the Earth's surface were: atmospheric pressure -- 628.6 mb; air temperature -- -33.7°; wind velocity -- 4.8 m/sec; relative humidity -- 78%; temperature at the snow surface -- -34.0°. The snow density was 0.31 g/cm^3. A south-southwesterly wind predominated. The falling of very fine ice crystals was observed. The mean heights reached by radiosondes was 21,390 m.

The characteristics of the ionosphere were those typical of summer -- clear reflections from all regular layers. The E and F1 layers showed a clear daily march, with maximum density of ionization at local noonday. The diurnal march of the F2 layer was "washed out." Intense ionospheric-magnetic disturbances were observed on 14 January which lasted for one day. Complete absorption of radio waves was noted at the height of the disturbance. Increased activity of the magnetic field was observed on 10, 11, 13 and 15 January. The activity of the magnetic field dropped off in the third 10-day period of the month.

Komsomolskaya Station

The new staff, consisting of two men, began work on 17 January 1960. B. G. Kazadayev is in charge.

Lazarev Station

The new staff, consisting of eleven men, began work on 23 December 1959. L. I. Dubrovin is in charge. The following remained at the station for the accomplishment of seasonal work: the geological and geographical team headed by D. S. Sokolov; three plane crews for the IL-14, LI-2 and AN-2 aircraft, under the command of A. N. Pimenov; and the crew of the sled-snowcat train, a total of 49 men, headed by the expedition chief, Ye. S. Korotkevich. Korotkevich left for Mirnyy by plane on 9 January.

In December the mean values at the Earth's surface were: atmospheric pressure -- 960.0 mb; air temperature -- -5.8°; wind velocity -- 8.1 m/sec; relative humidity -- 80%. Overall cloud cover was 6.0. An east-southeasterly wind predominated. Precipitation totalled 11.7 mm. The mean height reached by radiosondes was 20,300 m.

Observations have established that the crevasse at the edge of the shelf ice is continually expanding, the edge of the pack ice has shifted to Cape Hurricane, and icebergs are drifting along the edge of the shelf ice from north to south, then along the edge of the pack ice to the west.

In January the mean values at the Earth's surface were: atmospheric pressure -- 981.4 mb; air temperature -- -3.8°; wind velocity -- 8.3 m/sec; relative humidity -- 86%. During the month air temperature varied from +2.2° to -14.7°. An east-southeasterly wind predominated. The maximum wind velocity was 29.0 m/sec.

Work of the Field Parties

The geological and geographical team established two permanent tent camps in the mountains of Queen Maud Land at 71°40' S., 9°32' E., and 71°47' S., 5°49' E. at an elevation of 1,600 m. An AN-2 aircraft is based in the vicinity of the camps. Geological mapping covered the northern part of the mountains of Queen Maud Land between 11° and 3° E. and 71° and 72° S. A strip with a length of 250 km and an average width of 30 km was mapped at a scale of 1:2,000,000. In the area indicated seventy points were investigated by air and surface missions. Three classes of metamorphic rocks are components of the geological structure of the explored region: 1) biotite-hornblende-garnet, garnet-sillimanite and garnet-graphite-gneiss; 2) biotite-hornblende, biotite-pyroxene gneisses and hornblendes; 3) calcites. The overwhelming majority are of sedimentary origin The metamorphic rocks are slightly magmatized, eroded into large linear folds of sublatitudinal direction, complicated by folds of smaller dimensions, broken by numerous disjunctive dislocations.

The geophysical team made aeromagnetic profiles along longitudes 9, 10, 11, 12, 13, 14, 15, and 16° E. from the edge of the shelf ice to 73° S. In January the magnetic field was mostly calm; a weak disturbance was observed at night. An aerial photo survey of part of the Lazarev shelf ice was made at a scale of 1:25,000. The northern edge was surveyed at a scale of 1:35,000 along the route Lazarev station - Schirmacher Oasis, Mount Insel - Camp No. 3 - and the mountain near the prime meridian. The principal relief-forming factor in the area explored was the intense tectonic movement. The present-day uplift of sectors of land in most cases is proceeding through the stage of step-like terraces oriented in a west-east direction. The retreat of the ice mantle to the south is evidenced by the development of morainal deposits at elevations between 50 and 2,000 m. The team determined three third-order astronomical points, made astrogeodetic connections for the 70 geological sites, and made observations of flora and fauna. The nests of the snowy stormy petrel were encountered, a type of Stercorarius was noted from time to time, and a collection of mosses and lichens was made. At an elevation of 1,600 m the mean daytime temperature was -8° and the mean night temperature was -15°. A southeasterly wind predominated.

Departure of the Western Train

The western train, made up of four tractors and three sleds, left Lazarev station on 22 January for a crossing of the ice cap. Three holes with a total depth of 35 m were drilled at the first point, 69°57' S., 13°01' E., at a distance of 8 km from the station. Seismic sounding, glaciological, magnetic and meteorological observations were accomplished in a 2-km long sector. The exploratory route was 65 km long; beacons were established along this route and gravimetric measurements were made every 2-3 km. ("By Radio from Antarctica," by Ye. S. Korotkevich, Informatsionnyy Byulleten' Sovetskoy Antarkticheskoy Ekspeditsii, No. 18, 1960, pp. 38-40)

Somov Reports on the Meeting of the International Special Committee on Antarctic Research

M. M. Somov, Doctor of Geographical Sciences, Hero of the Soviet Union, recently returned from the August meeting of the International Special Committee on Antarctic Research held at the Robert Scott Polar Institute at Cambridge.

"Antarctica," he said, "is the world's coldest continent, but warm relationships prevail among various groups of people from countries with the most different social systems."

At the meeting the Soviet delegation proposed the compilation of a topographic and geologic map of the continent. It would consist of nineteen sheets. The Soviet expedition would assume responsibility for five sheets covering the coastal and interior regions of a considerable part of Eastern Antarctica.

Problems related to the improvement of Antarctic radio communications were discussed. A new system of collection of meteorological data was agreed to. Mirnyy and McMurdo will collect data and transmit it to Wilkes which maintains contact with the International Meteorological Center in Melbourne.

Much attention was devoted to problems of making a world-wide magnetic survey, plans for Antarctic expeditions in 1961 were discussed, and the problem of conservation of Antarctic plant and animal life was considered. ("Warm Wind from Antarctica," Nedelya, No. 28, 4-10 September 1960, p. 14)

New Place Names on the Map of Antarctica

Two prominent geographical features in Antarctica have been assigned names by Soviet authorities.

The IGY Valley (Dolina MGG) is situated in the eastern part of Antarctica between parallels 68°-80° S. and 55°-80° E. The northern part was explored by foreign expeditions, the southern part by Soviets. The configuration of the IGY Valley has been delineated for the first time on Russian maps.

The Lazarev Trough (Zhelob Lazareva) is a deep-water depression extending from the Davis Sea to Queen Victoria Land, a distance of 3,500 km, approximately parallel to the continental slope, 50 to 100 km from the coast. The trough is about 40 km wide.

The article provides additional information concerning these two geographical features and is accompanied by a sketch map showing their location. ("New Names on the Map of Antarctica," by B. V. Dubovskoy, Priroda, No. 7, 1960, p. 45)

Review of the Fourth Antarctic Expedition

A. Dralkin, Chief of the Fourth Antarctic Expedition, is the author of a 3,500-word summary of the activities and accomplishments of that expedition recently appearing in the journal Morskoy Flot. A scrutiny of the article indicates that all of the events and findings mentioned therein have already been published in the Soviet press and reported in greater detail in Information on International Geophysical Cooperation -- Soviet-Bloc Activities. Dralkin's article, however, is doubtlessly the best brief summary of the expedition's work which has yet been published.

An unsuccessful attempt was made to summarize Dralkin's article; it is a carefully prepared report in which the massive accomplishments of the Fourth Antarctic Expedition are already stated as concisely as possible. ("Fourth Antarctic Expedition," by A. Dralkin, Morskoy Flot, No. 4, 1960, pp. 35-38)

Soviets Puzzled by Find in Scott Glacier

A short article in Priroda, No. 7, 1960, discusses a minor mystery of the Antarctic. Members of the Second Antarctic Expedition discovered the bones of a seal at a point 130 meters above sea level and 20 kilometers from the nearest water. The bones were frozen in the ice; ice structure indicated that it had been in movement for a long time. The presence of morainal material in the ice showed that in the not too distant past it had been near the surface of bedrock.

The author, an associate of the Institute of Geography, rejects one possible solution after another: the seal could not have gone that distance under its own power; there are no surface predators in Antarctica -- so that is out; the bones could not have been picked up from the subglacial surface; man could have carried them here, but there is no record to show any expedition passed that way. ("Still Another Antarctic Riddle," by S. A. Yevteyev, Priroda, No. 7, 1960)

April in Antarctica -- Full Text of a "Priroda" Feature Article

The polar night began at Vostok station on 22 April. The depth of the snow cover is increasing. In the vicinity of Mirnyy and Lazarev the coastal ice is becoming thicker and the entire Davis Sea is covered with new ice. On 6 April the last Adele Penguins left the coast near Mirnyy. In the first 10 days of April the silver-grey stormy petrels and Stercorarius flew off and the seals disappeared. The Emperor Penguins are also preparing for a severe winter; they have formed a colony populated by 20,000 birds.

A severe snowstorm raged in the Mirnyy area on 22 April. The observatory buildings were buried in drifts right up to the eaves. The airfield was covered by drifts and the polar workers were forced to roll the landing strip.

The mean air temperature at Mirnyy dropped to -16.2°, at Vostok to -67.6°, and at Lazarev to -19.8°.

April in Antarctica was cold this year. The mean air temperature at Mirnyy was 4.4° lower than in the preceding four Aprils. It was 4.8° lower at Vostok than in 1958-1959; at Lazarev it was 6.5° colder than in the preceding year. The absolute minima were also lower than in those years. The greater intensity is due to the fact that the warm air of the temperate latitudes very rarely penetrated into the Antarctic continent.

Scientific observations were made at all stations. Investigations of seismic waves made by the American glaciologist Duart show that continental structures continue from Mirnyy to Drake Strait. Abundant bottom fauna has been discovered in the vicinity of the Mirnyy observatory. During a mass catch in the surface waters along the coast a total of 70 kg of fish were caught (about 600 fishes); the largest of these fish weighed 670 g. Glaciological traverses were made on the Western Shelf Ice and on

the Shackleton Shelf Ice. It was determined that the gigantic iceberg situated in this region is continuing to remain in its fixed position. Broad and level ice surfaces were explored on the ice cap between Mill and Bowman domes.

There were 23 clear nights at Lazarev, and on 22 nights intense auroras were observed. They were situated on the southern and eastern half of the heavens and extended to the zenith.

The first movable temporary meteorological station "Druzhba" has been set up on the Western Shelf Ice, on the Zavadovskiy dome. A group of Soviet polar specialists is working at this station, together with the Czechoslovakian scientist O. Kostka. ("News from the South Polar Continent," by Yu. V. Khmarskaya, Interdepartmental Committee for the Study of the Antarctic of the Academy of Sciences of the USSR, Priroda, No. 7, July 1960, p. 48)

Abstracts of Articles from the "Bulletin of the Soviet Antarctic Expedition"

The following are brief abstracts of articles in issue 17 of the Informatsionnyy Byulleten' Sovetskoy Antarkticheskoy Ekspeditsii (1960):

1) "Sculptural Forms of Surface Ice in Antarctica and Their Origin," by M. A. Kuznetsov, Junior Scientific Worker, Second Continental Expedition, pp. 5-8.

Kuznetsov discusses microrelief forms of the Antarctic ice surface resulting from erosional activity in the 400-km coastal zone of that continent. Sculptured forms arise during the period of thawing. The process of wind erosion therefore does not occur to any appreciable extent in the period March-November. It is the thawing process, combined with the wind, that is responsible for the microrelief of the surface. These processes are described in some detail.

2) "Turbulent Friction in Antarctica," by I. D. Kopanev, Senior Scientific Worker, Main Geophysical Observatory, pp. 9-11.

This article reports on a method for quantitative evaluation of the areal variability of turbulent friction in Antarctica. The method was developed at the Main Geophysical Observatory. Turbulent friction has its highest values near the coast in the cold season of the year. (Table 1 gives monthly values for 5 Soviet stations.) Table 2 gives the critical values for turbulent friction at which particles of snow are lifted from the surface and moved along. The author points out that absolute wind velocity is not the only index of importance; gustiness is also an important factor. Data for the latter phenomena are cited in Table 3.

3) "Warm Deep Waters in the Weddell Sea," by V. V. Klepikov, Candidate in Geographical Sciences, Leningrad Higher Naval Engineering College im. Admiral Makarov, pp. 12-15.

This article is based on a study of the size, volume and thermal conditions of warm deep currents in the Weddell Sea, their origin, circulation and relation to currents northward from the Antarctic coast. Comparisons are made with the penetration of Atlantic waters into the Arctic basin. There are two tables referenced to a sketch map.

4) "On the Problem of Wind Drift of Icebergs," by V. L. Lebedev, Candidate in Geographical Sciences, Third Continental Expedition, pp. 16-17.

There has been much discussion on the usability of iceberg drift for determining the direction of marine currents. Actually, says the author, the action of winds and waves causes the iceberg to follow a complex spiral or looping course (Figure 2).

5) "On Conditions for Gravimetric Measurements on the Diesel-Electric Vessel Ob' During Antarctic Voyages," by N. P. Grushinskiy, Moscow State University, pp. 18-21.

Tests were made aboard the "Ob'" to determine the feasibility of using pendulums and gravimeters on shipboard during Antarctic voyages. In subantarctic waters approximately 10% of the time was suitable for gravimetric observations with pendulums on ships such as the "Ob'." There is a sharp decrease in usable time when such a vessel is in ice-filled waters. When making such observations on diesel-electric vessels it is necessary to turn off the motor to eliminate vibrations. The point for installation of the instrument on the ship is also critical.

6) "Deflection of the Vertical in Antarctica," by A. I. Frolov, Candidate in Technical Sciences, State Astronomical Institute, pp. 22-24.

This article discusses deflections of the vertical in Antarctica, especially in the area from the Leopold and Astrid Coast to the Knox Coast (see map of deflections, Figure 1). This area is characterized by relatively small deflections of the vertical.

7) "A New Variety of Byrum Korotkevicziae," by L. I. Savich-Lyubitskaya and Z. N. Smirnova, Doctors of Biological Sciences, Botanical Institute of the Academy of Sciences, pp. 25-27.

The authors describe a moss collected on the eastern side of a large lake situated 15 km to the northwest of the Banger Hills. It constitutes a variety of Byrum Korotkevicziae (see seven sketches of the plant in Figure 1). A full Latin description is given, together with the newly assigned botanical name (the Latin text is also given in Russian).

8) "Principal Aeronavigational Method in Antarctica," by R. V. Robinson, Senior Navigator Fourth Continental Expedition, pp. 28-31.

Because the magnetic compass is virtually useless at high latitudes and because radio facilities are very widely scattered or nonexistent, the principal method of aerial navigation over Antarctica is the use of the astronomical compass using a grid of conventional meridians on charts with a stereographic polar projection. The author describes the 1:3,000,000 air chart of Antarctica and the manner in which it is used in aerial navigation.

9) "Publication of the Works of the Soviet Antarctic Expedition," pp. 32-33.

The Arctic and Antarctic Institute has already published several volumes of papers pertaining to the work of Soviet Antarctic expeditions during the International Geophysical Year. Volume I is devoted to problems of the organization of the First Continental Expedition and the scope of its work. Volume II contains many of the results of the First Continental Expedition. Volume III contains meteorological and actinometric data collected during the first expedition. Volume IV contains aerological data for the same expedition. Both Volume III and Volume IV describe observational procedures and the instruments used. Volume VI contains oceanographic data from the Second Marine Expedition aboard the "Ob'." "A Listing of Geographical Names in Eastern Antarctica" has also been published; it contains new names assigned to geographic features in Antarctica. Volumes V and VIII will soon be published; they will contain descriptions of the Second Naval Expedition and the Second Continental Expedition.

10) "Valuable Beginning," by V. A. Bugayev, pp. 41-42.

A. V. Nudel'man is the author of the book "Soviet Expeditions in Antarctica 1955-1959." Published by the Academy of Sciences in 1959, it summarizes the activity of the First, Second and Third Continental Expeditions. It covers every aspect of their work, but it is not stated in what detail. The number of pages is not indicated.

The following are brief abstracts of articles in issue 18 of the Informatsionnyy Byulleten' Sovetskoy Antarkticheskoy Ekspeditsii (1960):

1) "The Lazarev Shelf Ice, its Morphology and Origin," by V. Kh. Buynitskiy, Doctor of Geographical Sciences, Leningrad State University, pp. 5-8.

The shelf ice between 4° and 16° E. was investigated. The physical characteristics of the ice are described in detail; information is provided on surface microrelief. The reasons are given for the origin and disappearance of shelf ice are discussed; it is pointed out that all shelf ice is retreating, and that a continuation of present climatic conditions will result in its total disappearance.

2) "On Peculiarities of the Structure of the Ice Cover of the Marginal Zone of Antarctica in the Vicinity of Mirnyy," by B. A. Savel'yev, Doctor of Geological-Mineralogical Sciences, Fourth Continental Expedition, pp. 9-10.

On 24 June 1959 an iceberg which calved near Mirnyy fell on its side and presented an unusual opportunity to study its vertical structure -- that is, the structure of the coastal part of the ice cap. An analysis was made layer-by-layer, permitting speculation as to the historical development of the ice cover along the coast.

3) "Some Features of the Structure of the King George V Coast and the Oates Coast Based on Geophysical Data," by S. A. Ushakov, Graduate Student, Moscow State University, pp. 11-14.

This article contains data on the geological structure and rock types in the area mentioned in the title; it also discusses seismic and gravimetric investigations made in the period 1957-1958. Information is supplied on offshore depths, onshore thickness of the ice, subglacial terrain, etc.

4) "On the Problem of the Study of the Interconnection of Synoptic Processes in Both Hemispheres," by M. Sh. Bolotinskaya, Candidate in Geographical Sciences, pp. 15-19.

Bolotinskaya's article is of general interest to meteorologists and climatologists, and concerns Antarctica only in that atmospheric phenomena on that continent cannot be fully understood until the general circulation of the atmosphere is understood for our entire planet. The author shows that processes in Antarctica are immediately associated with those in the Southern Hemisphere, and these in turn are closely related to those north of the Equator.

5) "Preliminary Results of Observations of Auroras in the South Geomagnetic Zone," by V. S. Ignatov, Candidate in Technical Sciences, Arctic and Antarctic Scientific Research Institute, pp. 24-27.

This article gives the preliminary results of visual and spectral observations of auroras at Vostok during the period March-October 1959. Information given includes direction, time of day, seasonal occurrence, form, color, altitude, intensity, associated phenomena, and course of development. Most of the article deals with the results obtained by the use of a S-180S spectral camera.

New Arctic Expedition

The expedition "Sever-12" headed into the Arctic from Leningrad on 21 September. It is headed by N. Tyabin, Candidate of Geographic Sciences, the experienced polar explorer who is director of the scientific research observatory at Tiksi.

Two stations are drifting in the Arctic at present, the "Severnyy Polyus-8" and the "Severnyy Polyus-9." The new expedition will supply these daring high-latitude explorers with all that is needed for the winter period. ("New Expedition in the Arctic"; Moscow, Pravda, 22 September 1960, p. 4)

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